

ATTACHMENT P-5

MAMMAL DATA

**Casmalia Hazardous Waste Management Facility
Biological Surveys for Remedial Investigation/Feasibility Study**

Mammals Observed Within and Adjacent to the Landfill

March-August 2001 (unless otherwise indicated)

Common Name	Scientific Name	Federal/State Regulatory Status	Observations
Broad-handed mole	<i>Scapanus latimanus</i>	None	Burrows observed around most of the surface runoff ponds.
California myotis	<i>Myotis californicus</i>	None	1 June 2001: 1 individual detected foraging over Casmalia Creek willow riparian corridor, W of landfill (see individual bat acoustic data sheets for additional information). 11 June 2001: 1-2 individuals detected foraging over Casmalia Creek willow riparian corridor W of landfill; 1 individual detected foraging over Casmalia Creek riparian corridor and adjacent grassland approximately 0.5 miles NW landfill (see individual bat acoustic data sheets for additional information). 31 July 2001: 1-2 individuals detected foraging around lights at Administration Building and Scale House near main landfill gate (see individual bat acoustic data sheets for additional information).
Yuma myotis	<i>Myotis yumanensis</i>	Federal Sensitive Species/Species of Special Concern	1 June 2001: 1-3 individuals detected foraging over SE end of Pond A-5; 1 individual detected flying over SE end of A-Series Pond (see individual bat acoustic data sheets for additional information). 31 July 2001: 1 individual detected foraging over NE end of A-Series Pond (see individual bat acoustic data sheets for additional information).
Mexican free-tailed bat	<i>Tadarida brasiliensis</i>	None	1 June 2001: 1-2 individuals detected foraging around lights near Treatment Building parking lot (see individual bat acoustic data sheets for additional information). 31 July 2001: 1 individual detected flying over NE end of A-Series Pond; 1 individual detected foraging around lights near Treatment Building parking lot; 1 individual detected foraging around lights near Administration Building and Scale House near main landfill gate (see individual bat acoustic data sheets for additional information).

Black-tailed hare	<i>Lepus californicus</i> (subspecies unknown)	If subspecies <i>bennettii</i> , then Federal Sensitive Species/Species of Special Concern	27 April 2000: Two individuals flushed from grassy slopes S of landfill and E of Casmalia Creek.
Brush rabbit	<i>Sylvilagus bachmani</i>	None	Commonly observed on flat grassland within and adjacent to landfill.
California ground squirrel	<i>Spermophilus beecheyi</i>	None	Commonly found within and adjacent to the landfill, including the landfill caps. Burrows of this species provide refugia for amphibians and reptiles, such as Pacific treefrog (<i>Pseudacris regilla</i>), California red-legged frog (<i>Rana aurora draytonii</i>), gopher snake (<i>Pituophis melanoleucus</i>), and two-striped garter snake (<i>Thamnophis hammondi</i>).
Botta's pocket gopher	<i>Thomomys bottae</i>	None	Burrows of this species are found throughout the landfill, including the landfill caps.
California pocket mouse	<i>Perognathus californicus</i>	None	16-24 July 2001: 8-10 pocket mice observed in weedy grassland on slopes of Caustics/Cyanide Landfill and Metals Landfill following discing to remove vegetation. Several captured and relocated to grassland N of landfill. Burrows of this species are common throughout all of the landfill caps.
Brush mouse	<i>Peromyscus boylii</i>	None	16-24 July 2001: 5-6 individuals observed in weedy grassland on slopes of Caustics/Cyanide Landfill and Metals Landfill following discing for vegetation removal. 2 captured and relocated in grassland N of landfill.
Deer mouse	<i>Peromyscus maniculatus</i>	None	18 July 2001: Droppings, presumably belonging to this species, found in abandoned sheds in NW corner of landfill.
Dusky-footed woodrat	<i>Neotoma fuscipes</i>	None	16-24 July 2001: Several individuals observed in weedy grassland on slopes of Caustics/Cyanide Landfill and Metals Landfill following discing for vegetation removal.
California vole	<i>Microtus californicus</i>	None	27 April 2000: Nests belonging to this species were observed in the lower Casmalia Creek riparian corridor, near the confluence of Shuman Canyon Creek.
Grey fox	<i>Urocyon cinereoargenteus</i>	None	Runways presumably belonging to this species, are common in relatively undisturbed grassland around the margins of the landfill, and in grazed grassland surrounding the landfill. Fox scat, presumably belonging to this species, was observed at several locations on dirt access roads within the landfill boundaries.

Coyote	<i>Canis latrans</i>	None	Commonly observed and heard calling (at night) within and adjacent to landfill.
Raccoon	<i>Procyon lotor</i>	None	Tracks and scat commonly observed around margins of all of the surface runoff ponds and along Casmalia Creek riparian corridor.
Ringtail	<i>Bassariscus astutus</i>	None/Fully-Protected Furbearer	27 April 2000: Tracks of this species were observed along Casmalia Creek W of the landfill.
Striped skunk	<i>Mephitis mephitis</i>	None	Tracks and digs commonly observed throughout landfill and along Casmalia Creek. 20 April 2001: Adult flushed from dense weedy grassland/scrub in daytime in ravine W of PCB Landfill.
American badger	<i>Taxidea taxus</i>	None/Fully-Protected Furbearer	27 April 2000: Adult observed foraging on grassland slopes E of Casmalia Creek and S of landfill. March 2001: Recent dens and foraging digs observed in grassland slopes between landfill and Casmalia Creek. 14 May 2001: Recent badger den found in bank above SE end of A-Series Pond.
Bobcat	<i>Felis rufus</i>	None	Bobcats are commonly observed day and night within the landfill boundaries; tracks are common around all of the surface runoff ponds.
Wild pig	<i>Sus scrofa</i>	None	Pigs are occasionally observed within the landfill boundary, but forage throughout the site, as evidenced by scat and extensive diggings, particularly around marshy margins of surface runoff ponds.
Black-tailed deer	<i>Odocoileus hemionus</i>	None	Deer are commonly observed throughout the landfill and on adjacent lands.

2001 FALL SURVEY

**Casmalia Hazardous Waste Management Facility
Biological Species and Habitat Survey Fall 2001 Mammal Survey**

Table D

Surveyors: Bill Goggin, Allan Bate, Michael Clary

Common Name	Scientific Name	Federal/State Regulatory Status	Observations
Raccoon	<i>Procyon lotor</i>	None	11/19/2001 Detected one individual (tracks) during mammal presence/absence survey of Casmalia Creek. This common urban species is presumed to be present throughout the site (1600).
Brush mouse	<i>Peromyscus boylii</i>	None	11/19/2001 Detected one individual (visual) during mammal presence/absence survey of Casmalia Creek (1600).
Black-tailed deer	<i>Odocoileus hemionus</i>	None	11/19-11/21/2001 Approximately 17 individuals detected over three day period (visual, tracks and scat) during mammal presence/absence survey of site. This ubiquitous ungulate species is presumed to be present throughout the site.
California ground squirrel	<i>Spermophilus beecheyi</i>	None	11/19-11/21/2001 Dozens of individuals detected over three day period (visual, tracks and scat) during mammal presence/absence survey of site. This species is presumed to be present throughout the site and on adjacent lands, particularly in lowland areas.
Townsend's mole	<i>Scapanus townsendii</i>	None	11/20/2001 Detected one individual (carcass) during mammal presence/absence survey of RCF pond. This species is presumed to be present throughout the site and on adjacent lands (1400).
Bobcat	<i>Felis rufus</i>	None	11/21/2001 Detected one individual (tracks) during mammal presence/absence survey of Flats North of RCF pond. This species is commonly seen during the day and night on-site and is presumed to be present on adjacent lands as well (1400).

**Casmalia Hazardous Waste Management Facility
Biological Species and Habitat Survey Fall 2001 Mammal Survey**

Table D

Surveyors: Bill Goggin, Allan Bate, Michael Clary

Common Name	Scientific Name	Federal/State Regulatory Status	Observations
Striped Skunk	<i>Mephistis mephistis</i>	None	11/19-11/21/2001 Four individuals Detected over three day period (visual, tracks) during mammal presence/absence survey of Casmalia Creek, Liquids Treatment Area, Flats North of RCF pond, and Pond 18. This common species is presumed to be present on-site, and on adjacent lands.
Grey fox	<i>Urocyon cinereargentus</i>	None	11/19/2001 Detected one individual (tracks) during mammal presence/absence survey of Casmalia Creek. This common species is presumed to be present throughout the site, and on adjacent lands (1600).
Mountain Lion	<i>Felis concolor</i>	None/Fully protected	11/19/2001 Detected one individual (tracks, scat) during mammal presence/absence survey of Casmalia Creek. This fully protected species has been seen on-site during evening hours and is presumed to be present off-site as well (1600).
Wild Pig	<i>Sus scrofa</i>	None	11/21/2001 Detected species presence (diggings) during mammal presence/absence survey of unnamed drainage north of landfill site. This species has occasionally been seen on-site and is presumed to be present off-site (1200).
Brush rabbit	<i>Sylvilagus bachmani</i>	None	11/19-11/21/2001 Detected three individuals over three day period (visual, tracks, scat) during mammal presence/absence survey of Casmalia Creek, ravine west of PCB landfill, and flats north of RCF Pond. This common species is presumed to be present on-site and off-site.
Coyote	<i>Canis latrans</i>	None	11/19-11/21/2001 Approximately six individuals detected over three day period (visual, tracks and scat) during mammal presence/absence survey of site and adjacent lands. This common species is presumed to be present throughout the site as well as on adjacent lands.

2002 SPRING SURVEY

Table D
Casmalia Hazardous Waste Management Facility
Biological Species and Habitat Survey
Spring 2002 Mammal Survey

Common Name	Scientific Name	Federal/State Regulatory Status	Observations
Raccoon	<i>Procyon lotor</i>	None	3/11-3/14/02-4/30-5/02/02 Detected numerous tracks during mammal presence/absence survey of unnamed Drainage near Eucalyptus Grove. This common urban species is presumed to be present throughout the site (1600).
Brush mouse	<i>Peromyscus boylii</i>	None	5/03/02 Detected one individual (sign) during mammal presence/absence survey of Eucalyptus Grove.
Black-tailed deer	<i>Odocoileus hemionus</i>	None	3/11-3/14/02-4/30-5/02/02 Approximately 13 individuals detected over three day period (visual, tracks and scat) during mammal presence/absence survey of site. This ubiquitous ungulate species is presumed to be present throughout the site.
California ground squirrel	<i>Spermophilus beecheyi</i>	None	3/11-3/14/02-4/30-5/02/02 Dozens of individuals detected (visual, tracks and scat) during both March and April/May mammal presence/absence surveys. This species is presumed to be present throughout the site and on adjacent lands, particularly in lowland areas.
Striped Skunk	<i>Mephitis mephistis</i>	None	3/12-3/14/02 Three individuals detected over three day period (visual, tracks) during mammal presence/absence survey of Flats North of RCF pond, Ravine West of PCB Landfill and Pond 18. This common species is presumed to be present on-site, and on adjacent lands.
Wild Pig	<i>Sus scrofa</i>	None	3/12/02 Detected a total of 13 individuals (both adult and juvenile) at Ravine West of PCB Landfill and Pond A-13 during mammal presence/absence surveys. This species is routinely seen on-site and is presumed to be present on adjacent lands.

Table D
Casmalia Hazardous Waste Management Facility
Biological Species and Habitat Survey
Spring 2002 Mammal Survey

Common Name	Scientific Name	Federal/State Regulatory Status	Observations
Brush rabbit	<i>Sylvilagus bachmani</i>	None	3/11/-3/14/02 and 4/30-5/02/02 Detected several (>5) individuals (visual, tracks, scat) during mammal presence/absence survey of Ravine West of PCB Landfill, Flats North of RCF Pond and Pond A-5 . This common species is presumed to be present on-site and off-site.
Coyote	<i>Canis latrans</i>	None	3/11/-3/14/02 and 4/30-5/02/02 Detected approximately seven individuals (visual, tracks and scat) during March and April/May 2002 Spring mammal presence/absence surveys of site. This common species is presumed to be present throughout the area.
American Badger	<i>Taxidea taxus</i>	California Species of Concern	3/13/02 Detected single, deceased individual (visual) during mammal presence/absence survey along road, adjacent Pesticides Solvent Landfill. Mortality appeared to associated with car strike. This species is presumed to be present within the facility boundaries in less disturbed areas, as well as on adjacent lands.

BAT ACOUSTIC DATA SHEETS
2001

BAT ACOUSTIC DATA SHEET

SITE NUMBER 01-4 DATE 01 JUNE 2001 OBSERVERS P. Collins
L. E. HONAY

START TIME: 2210 END TIME: 2240 TOTAL TIME: 30mins.

LOCATION: CA: SANTA BARBARA Co., CASMalia LANDFILL; CONTROL
BLDG PARKING LOT; FLOODLIGHTS

WEATHER CONDITIONS: HIGH FOG, NO WIND; AIR = 14.3°C AT 2240

HABITAT: PARKING LOT; MOTHS FLYING AROUND LIGHTS

File Name	Species	Calls	Feeding Buzzes	Comments
B6012211.27	TABK	2	1	25-26 90m
.42	Talr	2	1	
.58	Talr	1		
B6012212.13	Talr	1	1	
.30	Talr	2		
.46	Talr	2	1	
B6012213.01	Talr	2		
.14	Talr	1	2	
.29	Talr	1		
.48	Talr	1		social call
.55	Talr	1		
B6012214.04	Talr	1		
.21	Talr	2	1	
.36	Talr	1		
.51	Talr	2		
B6012215.07	Talr	1	1	
.22	Talr	1		
.38	Talr	3		
.53	Talr	3		
B6012216.08	Talr	2		
.23	Talr	4		
.39	Talr	2		
.54	Talr	2		
B6012217.07	Talr	1		
.22	Talr	3	3	
.38	Talr	2	2	
.53	Talr	1		
B6012218.11	Talr	1		

File Name	Species	Min. Freq.	No. Bats	Feeding Buzzes
B6012218.05	Talr	20-30	1	
.40	Talr			
.55	Talr			
B6012219.10	Talr		W	
.25	Talr		W	1
.40	Talr		W	
.57	Talr		W	3
B6012220.13	Talr		W	
.28	Talr		—	
.41	Talr		—	
.49	Talr		—	
B6012221.05	Talr		—	1
.20	Talr		—	
.35	Talr		—	social calls
.50	Talr		—	
B6012222.05	Talr		—	
.17	Talr		—	
.41	Talr		—	
.56	Talr		W	
B6012223.11	Talr		W	W
.26	Talr		—	
.42	Talr		—	
.53	Talr		—	
B6012224.09	Talr		—	1
.24	Talr		—	
.39	Talr		—	
.54	Talr		—	
B6012225.09	Talr		—	1
.15	Talr		—	
.24	Talr		—	
.41	Talr		—	
.56	Talr		—	2
B6012226.11	Talr		—	
.27	Talr		—	1
.44	Talr		—	
.52	Talr		—	
B6012227.16	Talr		2	1
.31	Talr		W	2
.47	Talr		W	1
B6012228.05	Talr		—	1
.21	Talr		—	

File Name	Species	Min. Freq.	No. Bats	Feeding Buzzes
B6019228.36	Talps		2	
.51	Talps		2	
B6019229.02	Talps		1	
.12	Talps		1	
.23	Talps		1	
.41	Talps		2	1
.53	Talps		1	
B6019230.28	Talps		2	
.52	Talps		1	
B6019231.10	Talps	26 92Hz	1	
.55	Talps	25 92Hz	1	
B6019232.18	Talps		1	
.36	Talps		2	
.49	Talps		2	
B6019233.03	Talps		1	
.22	Talps		2	
.37	Talps		2	
.55	Talps		2	
B6019234.03	Talps		1	
.11	Talps		1	
.26	Talps		2	
.46	Talps		1	
B6019235.02	Talps		2	
.22	Talps		1	
.31	Talps		1	
.49	Talps		2	
B6019236.04	Talps		2	
.20	Talps		1	
.33	Talps		1	
.42	Talps		1	
.59	Talps		1	
B6019237.16	Talps		1	1
.31	Talps		2	
.46	Talps		2	
B6019238.02	Talps		2	2+ social calls
.10	Talps		1	
.27	Talps		1	
.40	Talps		1	
.58	Talps		1	
B6019239.18	Talps		2	
.26	Talps		1	

**BAT SURVEY REPORT
2004**

Bat Surveys at the Casmalia Land Fill
September 23 2004 to September 31 2004

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Bat surveys were conducted at the Casmalia Landfill from September 23 2004 through September 31 2004. The survey sites were chosen to duplicate the locations surveyed by Hunt & Associates, 2001. In the central California coastal region 15 species are known to occur. Of the 15 species ten were detected on Vandenberg Air Force Base in a study conducted 1997 through 1999 (Pierson et al. 2002).

Species Known to Occur in the Central California Coastal Region		
<i>Myotis yumanensis</i>	Yuma myotis	V
<i>Myotis evotis</i>	Long-eared myotis	
<i>Myotis thysanodes</i>	Fringed myotis	
<i>Myotis volans</i>	Long-legged myotis	
<i>Myotis californicus</i>	California myotis	V
<i>Myotis ciliolabrum</i>	W. small-footed myotis	
<i>Lasionycteris noctivagans</i>	Silver-haired bat	V
<i>Pipistrellus hesperus</i>	Western pipistrelle	
<i>Eptesicus fuscus</i>	Big brown bat	V
<i>Lasiurus blossevillii</i>	Western red bat	V
<i>Lasiurus cinereus</i>	Hoary bat	V
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	V
<i>Antrozous pallidus</i>	Pallid bat	V
Family MOLOSSIDAE (Free-tailed bats)		
<i>Tadarida brasiliensis</i>	Mexican free-tailed bat	V
<i>Eumops perotis</i>	Western mastiff bat	V
V= Detected on Vandenberg Air Force Base 1997 through 1999 (Pierson et al. 2002)		

Multiple Survey Techniques

To determine the presence/absence and relative abundance of the Sensitive bat species (Townsend's big-eared bat, pallid bat, and western red bat) as well as to characterize the general bat assemblage in the area, it is best use multiple survey techniques.

Each of the available survey methods (acoustic sampling, mist-net surveys, and roost surveys) has inherent biases and different detection likelihood for each bat species (Kalko et al. 1996, Pierson et al. 1996; Pierson and Rainey 1996, Simmons and Voss 1998). Although all three of these species have a low capture rate in mist nets, they can be captured in appropriate mist-net settings. The western red bat can be detected and identified with Anabat acoustic equipment. With focused attention the pallid bat is also identifiable with Anabat. The Townsend's big-eared bat is not easily detected with acoustic equipment. Both the pallid bat and the Townsend's big-eared bat have very distinctive guano characteristics and are easily detected through roost surveys. Using all three survey methods provided not only the most thorough evaluation of occurrence of the three target species but provided the best assessment of the entire bat species assemblage for the area.

Mist Netting

Mist-nets similar to those used to capture birds are set over water, trails, and in other known flyways. Bats are handled to collect the following data: reproductive condition, sex, age, and body measurements. After data are collected, the animal is released on-site. Mist-netting does not give an adequate indication of activity or abundance of bats in an area, but is used to gather data that can not be obtained without an animal in hand. Mist-netting sites are generally augmented by acoustic monitoring near the mist-nets to assess relative abundance/activity. All bats that are captured are recorded on release to confirm species identification and for future use in species call identification. One night of mist netting was conducted. Nets were set near Pond 13 over trails because of the possibility of pallid bats foraging or commuting along the roads and trails. No captures were made. Mist netting was not conducted over the ponds because of the nature of the water and sediments impounded in the ponds.

Roost Sampling

The Casmalia Landfill provides little or no roosting habitat suitable for bats. Most of the structures are metal buildings and have relatively high levels of human activity. Townsend's big-eared bats prefer large cavernous spaces such as caves attics and barns. Pallid bats are crevice roosters as well as cavern roosters, and will use crevices in rocks, bridges and dilapidated buildings. The western red bat is a foliage roosting bat and roosts in the foliage of trees and has been documented roosting in the foliage of cottonwood trees as well as willows (Pierson et al. 2002).

The administration building was visually assessed for potential roosting habitat and none was found. The small shed and horse stalls near the administration buildings were checked for signs of bat use and no sign was detected.

Acoustic Sampling

Equipment

Acoustic sampling was conducted with an Anabat II bat detector system (Titley Electronics). The Anabat system uses a bat detector to detect bat ultrasonic echolocation calls in the field and uses a z-caim unit to convert the detected signals into time/frequency (kilohertz (kHz)) graphs on a computer. Acoustic units (Anabat bat detector and CF-Storage ZCAIM) were placed in appropriate settings to collect bat calls. Appropriate settings included pond edges, eucalyptus groves, and riparian corridors. Acoustic units operated and collected data from sunset until sunrise. Nine detectors were placed at sites and operated between 19:30 and 06:30 throughout the seven day survey period.

Identification of Species

Detecting and identifying bat species with acoustic sampling is bound by two constraints: 1) how easily a bat is detected in the field, and 2) how reliably it can be identified by its call parameters once detected. Detectability depends on call intensity, call frequency, and distance from the detector. In general, species with low frequency, high intensity calls are detected at the greatest distance, and therefore are more frequently represented in acoustic sampling surveys (Pierson et al. 2001).

Identifying bat species by echolocation calls involves analyzing several call parameters such as base frequency, call shape, call pattern, call duration and interpulse time interval. Some bat species are more readily identifiable by their echolocation call features than other species. Knowledge of the local bat fauna and the ecology and biology of the bat species is necessary in analyzing acoustic data.

Five of the bat species likely to occur in the region are readily identified using the Anabat system. These species are Townsend's big-eared bat, pallid bat, western red bat, hoary bat and the western mastiff bat. Although discernible, Townsend's big-eared bat is rarely detected by acoustic units because it has a low intensity, high frequency call, and the bat must fly in extremely close proximity to the detector unit in order to be recorded.

Three groups of bats are difficult to distinguish by Anabat call sequence. The first set, silver-haired bat (*Lasiomycteris noctivagans*), big brown bat (*Eptesicus fuscus*), and Mexican free-tailed bat (*Tadarida brasiliensis*), all share similar call characteristics in the 20 kHz to 30 kHz frequency range. Some calls can be diagnostic, but most calls are difficult to differentiate. These calls are identified as 25kHz group in the analysis.

California myotis (*Myotis californicus*) and Yuma myotis (*Myotis yumanensis*) both have call frequencies between 45 kHz and 50 kHz. Call shape can be diagnostic, although it is often difficult to discern. The two species are best differentiated by their foraging

behavior and the location of the detector site. Yuma myotis flies close over water surfaces, foraging for emerging insects, while California myotis flies along vegetation edges, often at canopy height, in an erratic flight pattern. Calls that were indistinguishable between these two species were labeled 50K Myotis in the analysis.

Western small footed myotis (*Myotis ciliolabrum*), long-legged myotis (*Myotis volans*), and little brown myotis (*Myotis lucifugus*) comprise the third problematic group of taxa. These three species all have similar calls between 35-45 kHz and are very difficult to distinguish by call sequences. No 40kHz calls were recorded.

Species Detected or Considered Likely to Occur at the Casmalia Landfill		
<i>Myotis yumanensis</i>	Yuma myotis	
<i>Myotis californicus</i>	California myotis	
<i>Eptesicus fuscus</i>	Big brown bat	
<i>Lasiurus blossevillii</i>	Western red bat	FSS/WBVG
<i>Lasiurus cinereus</i>	Hoary bat	
<i>Corynorhinus townsendii</i> *	Townsend's big-eared bat	FSC/CSC/FSS/BLMS/WBVG
<i>Antrozous pallidus</i>	Pallid bat	CSC/FSS/BLMS/WBVG
Family MOLOSSIDAE (Free-tailed bats)		
<i>Tadarida brasiliensis</i>	Mexican free-tailed bat	
<p>FSC = Federal Special Concern species (former Category 2 candidates for ESA listing) CSC = California Department of Fish and Game's California Special Concern species FSS = Forest Service Sensitive species BLMS = Bureau of Land Management Sensitive species WBVG = Western Bat Working Group High Priority species *= Probable but not detected</p>		
<p>For more information on the meaning of these listings, please visit the Calif. Depart. of Fish and Game's California Natural Diversity Database website at www.dfg.ca.gov/whdab/assest/docs/spanim2001_Jan.pdf</p>		

Species Detected at Casmalia Land Fill By Site

Site	Lat	Long	# of files	50K Myotis	Myca	Myyu	Labl	25kHz group	Epfu	Tabr	Laci	Anpa
CAC06 Administration Area	34.85962	120.5394	458	X	X			X		X		X
CAC07 Off Site Casmalia Crk.	34.86301	120.5545	477	X	X			X		X	X	X
CAC10 Off Site North Drainage	34.86811	120.5408	142	X	X			X	X	X	X	X
CAC11 Pond A-5	34.86184	120.5495	477	X		X	X	X	X	X		
CAC12 North Boundary	34.86667	120.5421	21	X				X				
CAC13 W. Maint. Shed area Eucs.	34.86341	120.5447	65	X	X			X		X	X	X
CAC14 E. Maint. Shed area bank	34.86432	120.548	110	X	X			X		X	X	
CAC15 Pond 13	34.85846	120.5449	1753	X		X		X	X	X	X	
CAC16 A-Series Pond	34.85976	120.549	12970	X		X		X	X	X	X	X

Discussion of Results

Pallid Bat (*Antrozous pallidus*)

California Department of Fish and Game's California Special Concern species
 Forest Service Sensitive species
 Bureau of Land Management Sensitive species
 Western Bat Working Group High Priority species

Pallid bat calls were detected at six of the nine sites. Two of the sites were the off site in the North Drainage and along Casmalia Creek. Both of these sites provide natural foraging habitat and the North Drainage provides roosting habitat in the dead trees in the

eucalyptus grove and several call sequences were recorded very early in the night around emergence time.

Onsite pallid bat calls were detected at CAC06 the Administration area, CAC13 W. Maintenance Shed area Eucalyptus grove, and CAC16 A-Series Pond. All of these sites seem to be foraging areas for pallid bats, all call sequences were detected well after emergence.

Western red bat (*lasiurus blossevillii*)

Forest Service Sensitive species Western Bat Working Group High Priority species

Red bats call sequences were detected at one site during the surveys CAC11 Pond A-5. These bats are easily detected with acoustic monitoring and the low number of calls and few sites with detections suggests that red bats are not abundant in the area. Red bats are not known to reproduce along the California coast but are detected in higher numbers during fall and spring migrations.

Townsend's big-eared bat (*Corynorhinus townsendii*)

Federal Special Concern species (former Category 2 candidates for ESA listing) California Department of Fish and Game's California Special Concern species Forest Service Sensitive species Bureau of Land Management Sensitive species Western Bat Working Group High Priority species

No detections of Townsend's big-eared bat were made during the survey. This species is very difficult to detect acoustically and is not often caught in mist nets. There appears to be no roosting habitat for Townsend's big-eared bat onsite but there is suitable foraging habitat. This species is known to be common in the coastal region of central California and should be considered highly likely to be foraging onsite.

50kHz Myotis

This group includes California myotis (*Myotis californicus*) and Yuma myotis (*Myotis yumanensis*). Neither of these species have any special status. They are common throughout the coastal region of central California. More than 10,000 call sequences were recorded for this group. The majority of the call sequences were detected over

ponds suggesting that most were yuma myotis. CAC06 the Administration Area, CAC10 Off Site North Drainage, and CAC13 and CAC14 the Maintenance Shed areas all are no water areas at the time of the survey and 50kHz calls detected at these sites are likely myotis californicus.

25kHz Group

This group includes silver-haired bat (*Lasiurus noctivagans*), big brown bat (*Eptesicus fuscus*), and Mexican free-tailed bat (*Tadarida brasiliensis*). None of these species have any special status. The later two are common throughout the coastal region of central California. These bats have high intensity and low frequency calls and are easily detected at long distances. More than 2,400 calls of this type were detected during the survey period and all sites had detections of these calls. Calls with distinctive characteristics were detected for big brown bat and Mexican free-tailed bat. The silver-haired bat was a rare occurrence during the Vandenberg Air Force Study (Pierson et al. 2002) and is not considered a likely detection at the Casmalia Land Fill.

Hoary bat (*Lasiurus cinereus*)

Hoary bats call sequences were detected at six of the nine sites during the surveys. Although they were detected at six sites there were only 14 total call sequences. These bats are easily detected with acoustic monitoring and the low number of calls suggests that hoary bats are not abundant in the area. Hoary bats are not known to reproduce along the California coast but are detected in higher numbers during fall and spring migrations.

Discussion of sites

CAC06 Administration Area The Administration area site is a foraging area because of the lights that attract insects. This site recorded 458 calls and 4 species. The activities of the landfill have little impact on the bats at this site besides providing foraging at the lights.

CAC11 Pond A-5 Pond A-5 provides foraging for aquatic insects and drinking for the bats of the area. This site recorded 477 calls sequences and four species including the only two red bat sequences.

CAC12 North Boundary Calls recorded at this site were most likely bats recorded as they commuted through. The low number of calls sequences, 21 in roughly 70 hours of recording, and the low diversity two species suggest that this site is not important foraging habitat. This site can give a relative "background noise" to compare the other sites to.

CAC13 West Maintenance Shed Area eucalyptus trees This site had low activity, 65 call sequences, and good diversity, four species. The eucalyptus trees most likely provide insect diversity. Pallid bat Call sequences were recorded at this site.

CAC14 West Maintenance Shed Area bank This area does not provide any distinct foraging habitat and the majority of the call sequences were from the 25khz group. This group is easily detected at a distance and most call sequences were of commuting bats.

CAC15 Pond 13 This site had high numbers of call sequences, 1,753 and good diversity. This is due to the fact that Pond 13 provides foraging for aquatic insects and drinking for the bats of the area.

CAC16 A-Series Pond The bulk of the bat activity detected on the Casmalia Land Fill was recorded at this site, 12,970 call sequences, nearly 200 per hour. This site is a major foraging site for the bats of the area.

CAC07 Offsite Casmalia Creek This site is along a riparian corridor and provides excellent natural foraging habitat and drinking for the bats of the area. Moderate numbers of call sequences and high diversity were recorded. The largest numbers of pallid bat call sequences were recorded at this site.

CAC10 Offsite North Drainage This site is located along the North drainage in a grove of eucalyptus trees. The grove has numerous dead trees that provide roosting habitat. The level of bat activity recorded at this site was low, 142 call sequences, but diversity was high, five species. Pallid bat call sequences were recorded at the time likely to be emergence, suggesting that the pallid bats are roosting very near the site.

Natural History of Species Detected at the Casmalia Land Fill

Yuma Myotis (*Myotis yumanensis*) is a year-round resident in a wide variety of habitats from coast to mid-elevation. It is very tolerant of human habitation and survives in urbanized environments. Day roosts occur in buildings, trees, mines, caves, bridges, and rock crevices. Night roosts occur in buildings, bridges, and other man-made structures. The Yuma myotis is presumed to be non-migratory and hibernates in winter, but no large winter aggregations have been reported. A single young is born per year between June and July. Females form large maternity colonies from two hundred to several thousand individuals. Males tend to roost singly or in small groups. The Yuma myotis forages by trawling with its large feet on open water surfaces for emergent aquatic insects, such as caddis flies and midges. Foraging occurs directly over the surface of still water ponds, reservoirs, or pools in streams and rivers.

California Myotis (*Myotis californicus*) is common in most habitats throughout its range, which stretches from the Alaskan panhandle to Mexico (Simpson 1993). Although this bat is common and can be regularly encountered flying along trails at dusk, it is rarely an abundant species in any one area. Maternity colonies are usually small, generally less than 10 individuals. Day roosts are in rock crevices, peeling bark, tree hollows, and on buildings (Simpson 1993). This bat is very flexible in its choice of night roost and will use any natural or man-made shelter (Nagorsen and Brigham 1993). The California myotis is non-migratory and undergoes extended torpor during the winter months in most of its California range. It will arouse from torpor to forage during winter

months and has been observed foraging in temperatures as low as -8°C (Simpson 1993). California myotis usually produces one young per year and has a potential reproductive life span of 15 years. In California, mating takes place in early spring and young are born in late May and early June. The California myotis feeds primarily on moths and flies, with smaller amounts of beetles and bugs. Hunting takes place along edges of vegetation and the canopy, over water, and above open ground (Simpson 1993). This bat emerges in the evening and alternates foraging and roosting throughout the night.

Big Brown Bat (*Eptesicus fuscus*) occurs throughout most of North and Central America and reaches its southern limit in northwestern South America. Specimens are known from all the Canadian provinces bordering the US and from all the United States with the exception of Hawaii. This species decreases in numbers as one moves from a deciduous biome to a coniferous forest biome (Kurta and Baker 1990). Maternity colonies vary in size from small (ca. 5 individuals) to quite large (ca. 700 individuals) and are found in buildings, bridges, rocks and trees. The name *Eptesicus fuscus* means dusky house flier and refers to the species' preference for man-made structures. Males roost singly or in small bachelor groups in similar structures. In colder climates hibernacula are common in buildings and caves. In climates with less severe winters like California, migrations and/or periods of extended torpor take place (Nagorsen and Brigham 1993). In the west, big brown bat usually produce one offspring per year. Copulation occurs between September and March and sperm is stored until spring. Gestation is 60 days and young are born from May to July. Young become volant 18 to 35 days after birth. Recorded longevity in the wild is 19 years for a banded individual (Kurta and Baker 1990). Foraging occurs through the night with most of the activity in the first two hours after sunset. In terms of foraging, big brown bat is a generalist, showing no preference for over-water versus over-land sites, edge versus non-edge habitats, canopy versus open, and urban versus rural environments. Diet consists primarily of beetles. Other prey include moths, termites, carpenter ants, lacewings and various flies (Nagorsen and Brigham 1993).

Hoary Bat (*Lasiurus cinereus*) has the broadest range of any North American bat, ranging from Northern Canada to South America. This bat has even managed to colonize remote islands such as the Hawaiian Islands (Nagorsen and Brigham 1993) and is the only endemic mammal to Hawaii. The hoary bat roosts in the branches of deciduous and coniferous trees. In Oregon, the hoary bat prefers old-growth Douglas fir forests (Nagorsen and Brigham 1993). Males are solitary and females roost with their young, but do not form maternity colonies. The hoary bat is a migratory species and the Pacific Northwest population appears to winter in California and Mexico. Over a portion of its range, males and females occupy separate summer areas. Mating occurs in fall or winter and sperm is stored over winter. Fertilization occurs in early spring and gestation is 80 to 90 days. One to four young are born in late May to late June (Nowak 1994). Young are capable of sustained flight at six weeks and family groups stay together for several weeks after young are flying (Nagorsen and Brigham 1993). With its swift flight and low

frequency echolocation calls, this bat is well adapted for capturing large prey. The primary prey of the hoary bat is moths, beetles, and dragonflies (Nagorsen and Brigham 1993). The hoary bat hunts above canopy level, in clearings, and over water. This species has been known to set up foraging territories at bright lights where insects congregate (Fenton 1997).

Western Red Bat (*Lasiurus blossevillii*) is a Forest Service Sensitive species. Very little research has been done on the western red bat and little is known about this species. Much of the natural history is inferred from what is known about the Eastern red bat although the degree of similarity of the biology of these two species is unknown at present. The western red bat is a solitary foliage roosting bat. The western red bat is in the genus *Lasiurus*, the hairy-tailed bats. These bats are adapted for exposed roosting behavior with their hairy tail membrane and small ears. In California this species is known to roost in cottonwood trees and willows, but is commonly detected in a variety of habitats, including chaparral. Roost heights range from 3-15 meters (Pierson and Heady 1997). The range of the western red bat is from British Columbia to Central and South America. Migration occurs throughout its range and bats of Canada move into the coastal low lands of California, and the California population is thought to winter in Central America (Nagorsen and Brigham 1993). Mating takes place in late summer and fall, sperm is stored over winter and fertilization occurs in early spring. Gestation period is 80 to 90 days and one to four young are born in late May to early July. The young are born small, naked and underdeveloped (Nowak 1994). Females leave the young at the roosting site while foraging but will carry them when moving to a new roosting site. Young are capable of sustained flight at 6 weeks. Large moths are the primary prey of the western red bat. This bat is a fast flyer, foraging in straight flights or large circles (Nagorsen and Brigham 1993). The echolocation calls are highly variable depending on the terrain. Though variable, these calls are very distinct.

Townsend's Big-eared Bat (*Corynorhinus townsendii*) is a Federal Special Concern and California Special Concern species as well as a Forest Service Sensitive species. It is a year-round resident in California, occurring from low desert to mid-elevation montane habitats. It is found primarily in rural settings, from inland deserts to coastal redwoods, oak woodland of the inner Coast Ranges and Sierra Nevada foothills, and low to mid-elevation mixed coniferous-deciduous forests. It typically roosts during the day in caves and mines, but can roost in buildings that offer suitable conditions (Kunz and Martin 1982). Night roosts are in more open settings and include bridges. It hibernates in mixed sex aggregations of a few to several hundred individuals. Hibernation occurs for prolonged periods in colder areas and intermittently in non-freezing areas. Townsend's big-eared bat arouses periodically and moves to alternative roosts, and actively forages and drinks throughout the winter. A single young is born per year between May and July. Females form maternity colonies of 35 to 200 individuals, while males roost individually (Kunz and Martin 1982). Townsend's big-eared bat feeds primarily on small moths that are gleaned from vegetation.

Pallid Bat (*Antrozous pallidus*) is a California Special Concern species and Forest Service Sensitive species. A year-round resident in California, the pallid bat is found in arid desert areas, grasslands and oak savanna, coastal forested areas, and coniferous

forests of the mountain regions of California. Roost sites are typically rock outcroppings, caves, hollow trees, mines, buildings and bridges (Hermanson and O'Shea 1983). Pallid bats make use of similar structures for night roosting and will use more open sites such as eaves, awnings, and open areas under bridges for feeding roosts. Pallid bats are largely inactive in the winter months and there is evidence for both hibernation and migration. Hibernation aggregations tend to be much smaller than summer aggregations. Pallid bats have been observed foraging during the winter when prey is available (Hermanson and O'Shea 1983). Copulation occurs in the fall, usually October through December, although in coastal California copulations have been observed as late as February. Females store the sperm and ovulation occurs the following spring. Parturition timing is determined by local climate and embryonic development usually takes about nine weeks with birth occurring in May or June. Twins are the norm in northern California but in other areas the pallid bat is known to have triplets. Maternity colonies range from 20 to 200 individual adult bats. Males roost in much smaller groupings (Hermanson and O'Shea 1983). The pallid bat feeds on large insects (20 to 70 mm in length). Prey is most often caught on the ground. Jerusalem crickets, scorpions and beetles make up most of the diet of pallid bats central California.

Mexican Free-Tailed Bat (*Tadarida brasiliensis*) is one of the most widely distributed mammalian species in the Western Hemisphere and is the famous bat of the Carlsbad Caverns in the southwest. Maternity roosts occur in bridges, buildings, culverts, hollow trees and caves. Maternity colonies vary in size from 20 individuals to millions. In general, maternity colonies in California do not reach the remarkable size of the southwestern cave roosts. The largest known colony in California consists of around 200,000 individuals in a cave. Although the Mexican free-tailed bat is a year round resident of Northern California, evidence indicates localized migrations and in other parts of its range migrations can be longer than 1,800 kilometers (Wilkins 1989). The Mexican free-tailed bat is found in many different habitats from sea level to over 3,600 meters. Mating takes place in late February and March and ovulation occurs in March. Gestation is 77 to 82 days and young are typically born in late June or July (Nowak 1994).

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